REQUEST FOR INFORMATION

IN PREPARATION FOR THE PROCUREMENT OF AN EGNOS GEOSTATIONARY NAVIGATION PAYLOAD SERVICE - "GEO-3"

Ref: 212105

Issue: 1 Rev 0

Date: 17 June 2015

Index

1 Introduction

The European Geostationary Navigation Overlay Service (EGNOS), Europe's contribution to global navigation satellite systems, is currently in its service provision phase under the responsibility of the European GNSS Agency (GSA). EGNOS provides an augmentation service to the Global Positioning System (GPS) Standard Positioning Service (SPS). Presently, EGNOS augments GPS using the L1 (1575.42 MHz) Coarse/Acquisition (C/A) civilian signal function by increasing the accuracy of existing GPS satellites while providing a crucial 'integrity message', informing users in the event of signal problems. It also transmits an extremely accurate universal time signal.

EGNOS is providing 3 services, free of charge to the users:

- The EGNOS Safety of Life (SoL) Service: It is aimed at users for whom safety is essential; this service fulfils in particular the requirements of certain sectors for continuity, availability and accuracy and includes an integrity message alerting the user to any failure in, or out-of-tolerance signals from, systems augmented by the EGNOS system over the coverage area. It is subject to the service limitations described in the EGNOS SoL Service Definition Document (SDD) [1] ;

- The EGNOS Open Service (OS): It provides positioning and synchronisation information intended mainly for high-volume satellite navigation applications in the area covered by the EGNOS system. It is subject to the service limitations described in the EGNOS OS SDD [2] ;

- The EGNOS Data Access Service (EDAS): It aims at offering commercial data dissemination to promote the development of applications for professional or commercial use by means of improved performance and data with greater added value than those obtained through its open service. It is subject to the service limitations described in the EGNOS EDAS SDD [3] .

EGNOS message is currently broadcast to the users through navigation payloads on board 2 GEO satellites (for redundancy purpose) covering each an area which comprises latitudes from 20°N to 70°N and longitudes from 40°W to 40°E. Nominally, a third GEO payload is used for Test purpose (EGNOS-Test partition) and can be used in Operation (EGNOS-OP partition) in case one of the two GEO payloads used in EGNOS-OP needs to be replaced or moved to EGNOS-Test. This third GEO payload is also called "In-orbit spare". These payloads relay the Satellite Based Augmentation System (SBAS) signals generated on ground, allowing the users to benefit from the augmented positioning accuracy and integrity.

According to the end of life of some GEO satellites currently used on EGNOS, the necessity to ensure continuous EGNOS Signal In Space (SIS) availability and in view of future transition from EGNOS V2 to EGNOS V3 (to support Dual-Frequency Multi-Constellation (DFMC) services), the GSA is planning for the replenishment of EGNOS payloads with the procurement of the services to be delivered by one new navigation payload, starting from the envisaged year 2019.

In view of this foreseen procurement, GSA is issuing the present Request For Information (RFI) which has been prepared with ESA support. As the market at issue is very specific, GSA seeks to collect information about the market situation in terms of availability of future navigation payloads and to

seek opinions regarding certain aspects of the planned procurement, in particular in terms of feasibility of preliminary requirements. The outcomes of this RFI will be used for the preparation of the Tender Specifications of the envisaged procurement planned to be launched by end of 2015 (TBC). This RFI is complementing the prior information notice published by the GSA in EU Official Journal with regards to this foreseen procurement (OJ/S -S118-20/06/2015-212366).

Please note that:

i. **the GSA reserves its sole discretion regarding whether and when it will launch the actual procurement for the replenishment of the EGNOS GEO payload.**

ii. **the descriptive part of the present RFI is intended solely for the purpose of providing the broader context information to the market.**

iii. **neither the present RFI nor the answers to it are in any way binding on the GSA in its preparation of the potential procurement documentation.**

GSA will also take measures to ensure that the opinions expressed in the replies will not unduly bias its procurement and the resulting tender specifications will ensure as wide competition as possible.

2 References documents

[1] EGNOS Safety of Life Service Definition Document (SoL SDD), issue 2.2, 07/04/2015

[2] EGNOS Open Service Service Definition Document (OS SDD), issue 2.2, 12/02/2015

[3] EGNOS Data Access Service Service Definition Document (EDAS SDD), issue 2.1, 19/12/2014

[4] ICAO SARPS Annex 10, including up to Amendment 89 of 13/11/2014 (publicly available)

[5] MOPS for Global Positioning System/ Wide Area Augmentation System Airborne Equipment, RTCA/D0-229D, Dec. 2006 (publicly available)

[6] SBAS L5 DFMC ICD dated 13/04/2015 (will be delivered as part of the envisaged procurement procedure)

3 Acronyms

CPF	Central Processing Facility
C/A	Coarse/Acquisition
DFMC	Dual Frequency Multi-Constellation
EC	European Commission
ECAC	European Civil Aviation Conference
EDAS	EGNOS Data Access Service
EGNOS	European Geostationary Overlay Service
EIRP	Effective Isotropic Radiated Power
ENP	European Neighbouring Policy
EOIG	EGNOS Operator and Investors Group
ESA	European Space Agency
FIR	Flight Information Region
FOV	Field Of View
GEO	Geostationary Orbit
GPS	Global Positioning System
GSA	European GNSS Agency
IOT	In Orbit Test
MCC	Mission Control Centre
MOPS	Minimum Operational Performances Standards
NLES	Navigation Land Earth Station
OS	Open Service
PRN	Pseudo-Random Noise sequence
RFI	Request for Information
RHCP	Right-Hand-Circularly-Polarized

RIMS	Ranging and Integrity Monitoring Station
RTCA	Radio Technical Committee for Aeronautics
SBAS	Satellite Based Augmentation System
SDD	Service definition Document
SES	Single European Sky initiative
SIS	Signal In Space
SoL	Safety of Life
SPS	Standard Positioning Service
TBC	To Be Confirmed
TBD	To Be Defined
WAAS	Wide Area Augmentation System

4 Scope of the Document

The purpose of this RFI is to obtain information from the market participants and thus enable GSA to shape the potential procurement of an EGNOS navigation payload and its associated scope.

5 RFI Validity

Answers to the RFI shall only be addressed electronically to tenders@gsa.europa.eu before the 31st July 2015.

Information received under this RFI will be used only for the purposes stated in it.

GSA reserves the right to share the information received from the participants with ESA and EC within the framework of the existing confidentiality obligations between GSA and such parties or under specific Confidentiality Agreements as the case may be.

6 EGNOS System Presentation

6.1 Overall EGNOS System Architecture

The purpose of EGNOS is to implement a system that fulfils a range of user services requirements by means of an overlay augmentation to GPS and in the future to Galileo (EGNOS V3), based on the broadcasting through GEO satellites of GPS-like navigation signals containing integrity and differential corrections information applicable to the navigation signals of the GPS satellites, Galileo satellites and the EGNOS GEO satellites themselves. As a result, the EGNOS system can provide integrity positioning with Safety-of-Life (SoL) quality that allows it to address needs of all modes of transport, including civil-aviation.

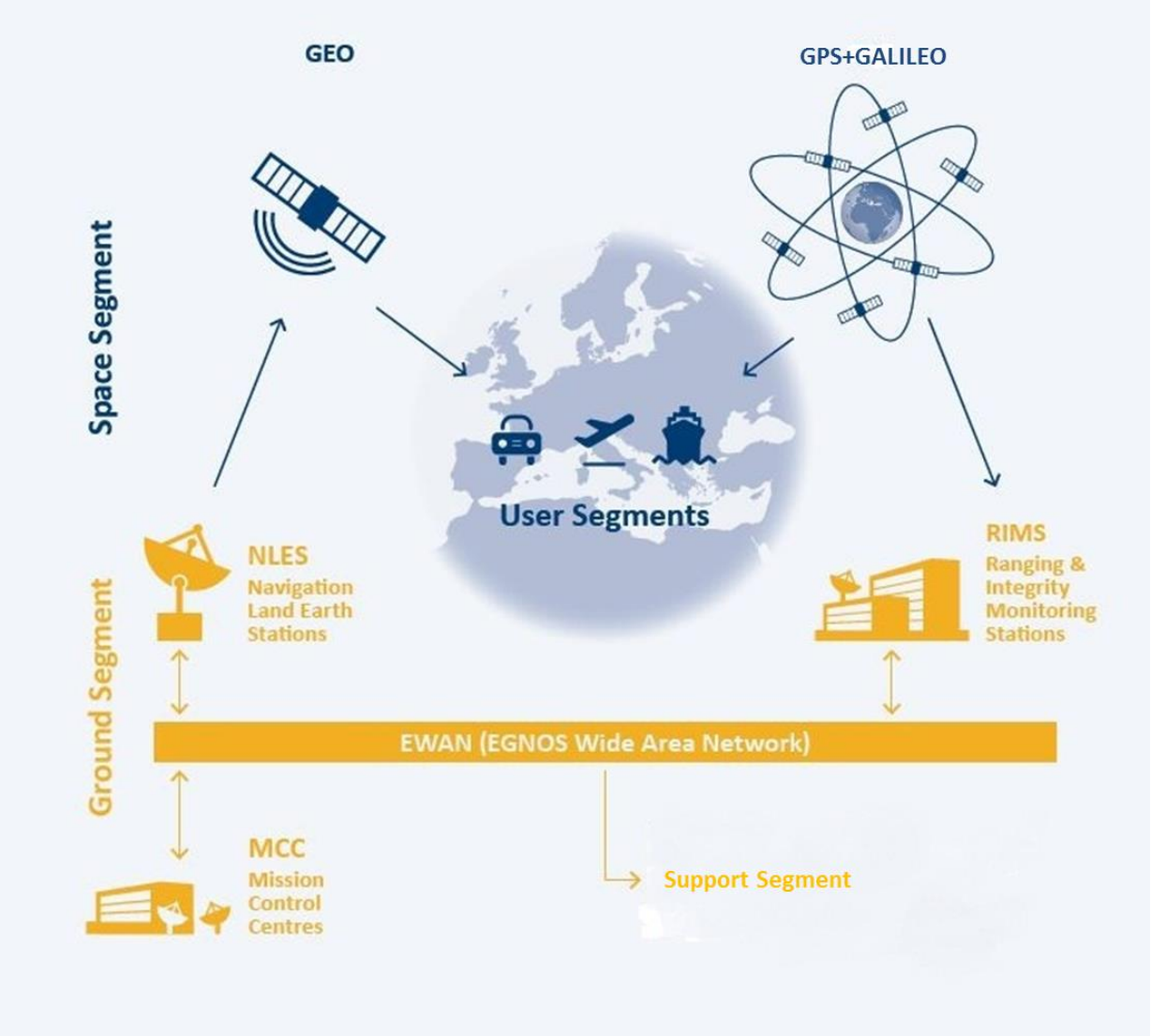

Figure 1: EGNOS Functional Architecture

The EGNOS covers primarily the ECAC region complementarily to other augmentation systems initiatives (such as WAAS in US) but extensions are being investigated to cover other adjacent regions. An example of the coverage extension for the Flight Information Region (FIR) of the ECAC and ENP is given in Figure 2. The northern limit of the GEO coverage will be determined by an elevation angle of 5^{o}.

The EGNOS ground segment is responsible for the computation of the integrity measurements and wide area differential corrections. To this purpose 39 Ranging and Integrity Monitoring Stations (RIMS) are deployed over the European countries (and for some of them worldwide) which collect the GPS, (Galileo in the future) and EGNOS GEO raw pseudo-range measurements. The network of RIMS is connected to 2 Mission Control Centres (MCCs) (of which one is master) where the integrity, differential corrections, ionospheric delays are computed by the Central Processing Facility (CPF). This information is sent in a message to the Navigation Land Earth Station (NLES) to be uplinked in a

GPS-like signal (following the SBAS signal specification as defined in [4]) to the space segment (2 GEO satellites). The GEO satellites broadcast the GPS-like signals transparently on the GPS L1 (1575.42 MHz) and L5 (1176.45 MHz) frequencies.

Following the recent modernization of the GPS, two additional signals are available for civil use: L2C at 1227.6 MHz and L5 at 1176.45 MHz. A second generation of the EGNOS system, known as EGNOS V3, is currently under definition and prototyping phase to support Dual-Frequency Multi-Constellation (DFMC) services, with integrity messages broadcast in the L5-band simultaneously to L1-Band.

Further information on the EGNOS system architecture can be found in [1] .

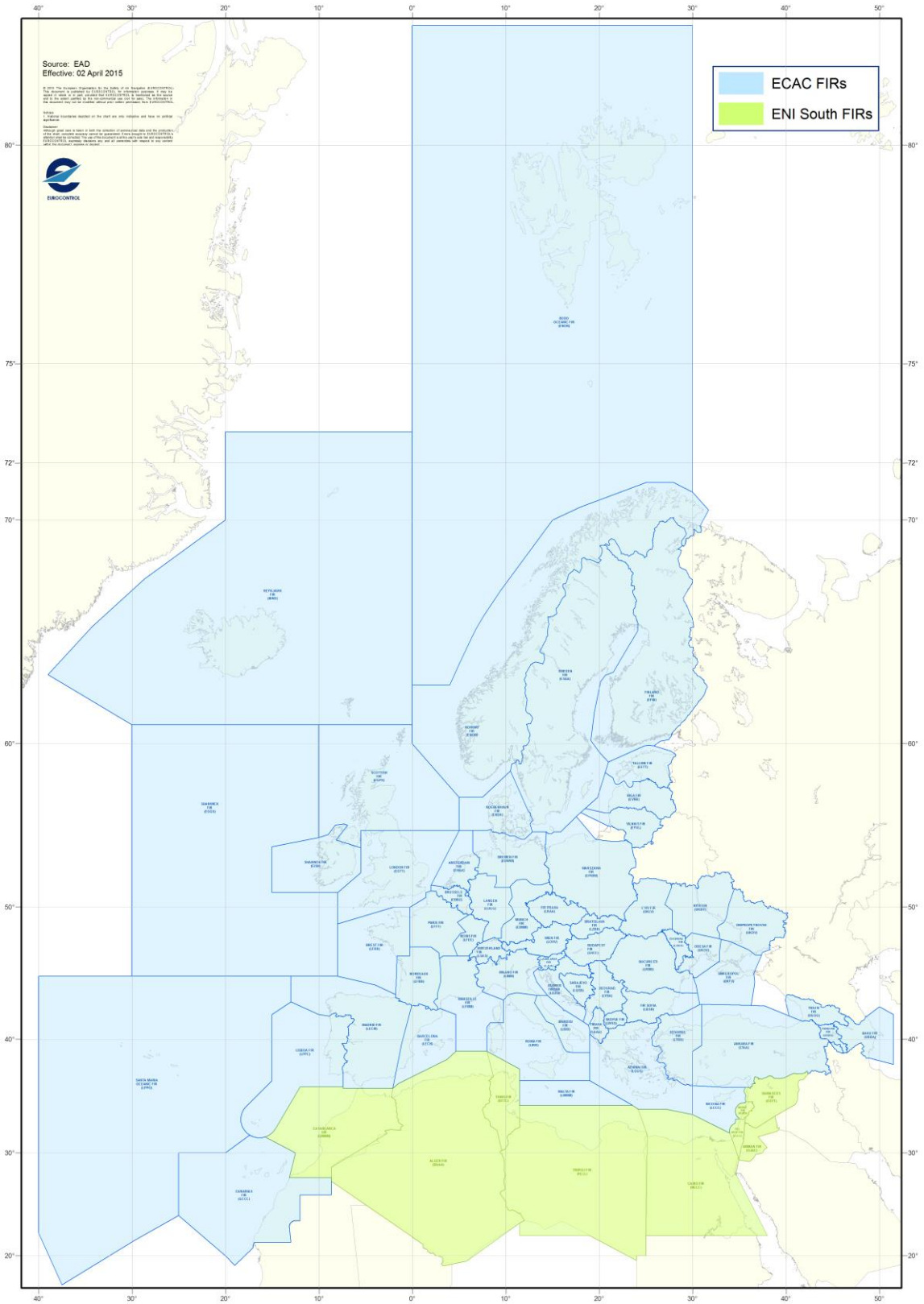

Figure 2: ECAC and ENP Region Coverage FIR

6.2 EGNOS Space Segment Current Situation

The SoL service requirements in terms of continuity and availability defined in the EGNOS system mission requirements imply that the service area is continuously covered by at least 2 independent EGNOS GEO payloads. These two payloads are part of the operational system (EGNOS-OP).

In addition to the operational configuration, a backup GEO payload (in-orbit spare) is needed. This third GEO is required in order to ensure the long term availability of the service, in case of unplanned failure of one of the two "primary" GEO. This additional payload is part of the so-called EGNOS-TEST system. The backup payload can be used either for the technical qualification of new EGNOS system releases or by the EGNOS Service Provider for the operational qualification of a new release before it is deployed on the operational system.

Figure 3 below shows the coverage achieved with the current GEO baseline.

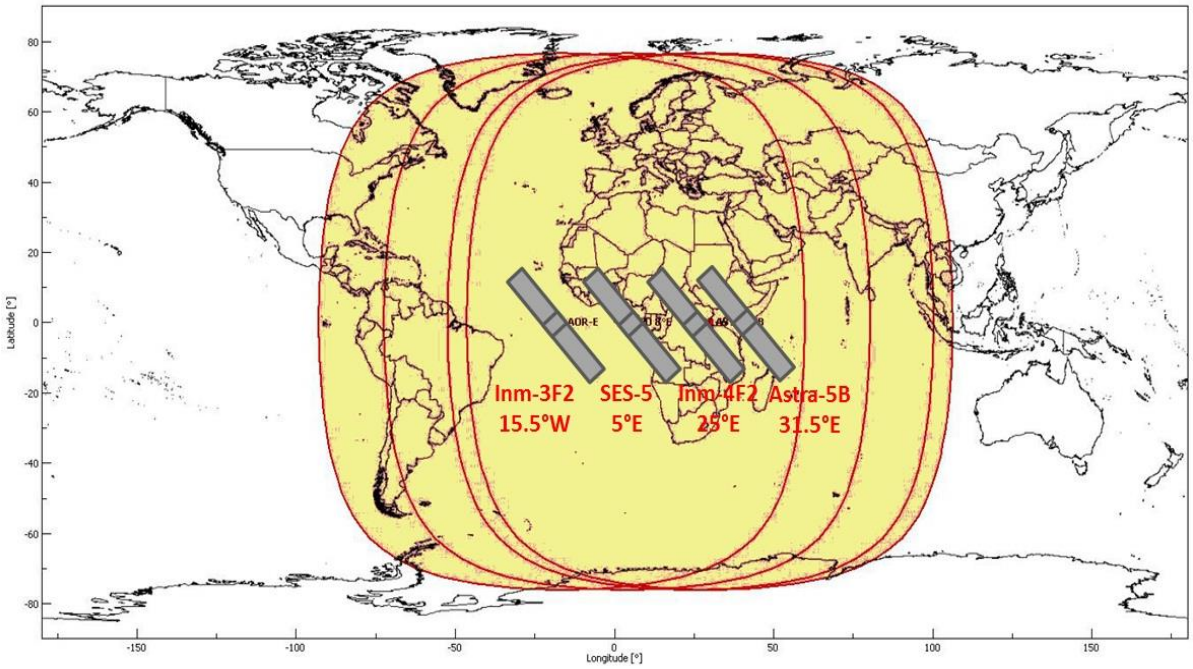

Figure 3: Current GEO Coverage for EGNOS

The current operational configuration (EGNOS-OP) is based on Inmarsat-3F2 (15.5° W) and Inmarsat-4F2 (25° E), while SES-5 (5° E) is in the EGNOS-TEST configuration. Astra-5B is in orbit and currently undergoing integration with the EGNOS ground segment. It is planned that the two OP GEOs should be replaced in the operational configuration as follows:

- In September 2015 SES-5 should replace Inm-4F2.
- In mid-2016 Astra-5B should replace Inm-3F2.

The new resulting OP configuration should remain unchanged until the arrival of GEO-3 in 2019. GEO-3 should then replace Inm-3F2 after its end of mission and should support the EGNOS V3 testing and qualification.

The following chart shows the currents status and plans for the use of GEOs by EGNOS.

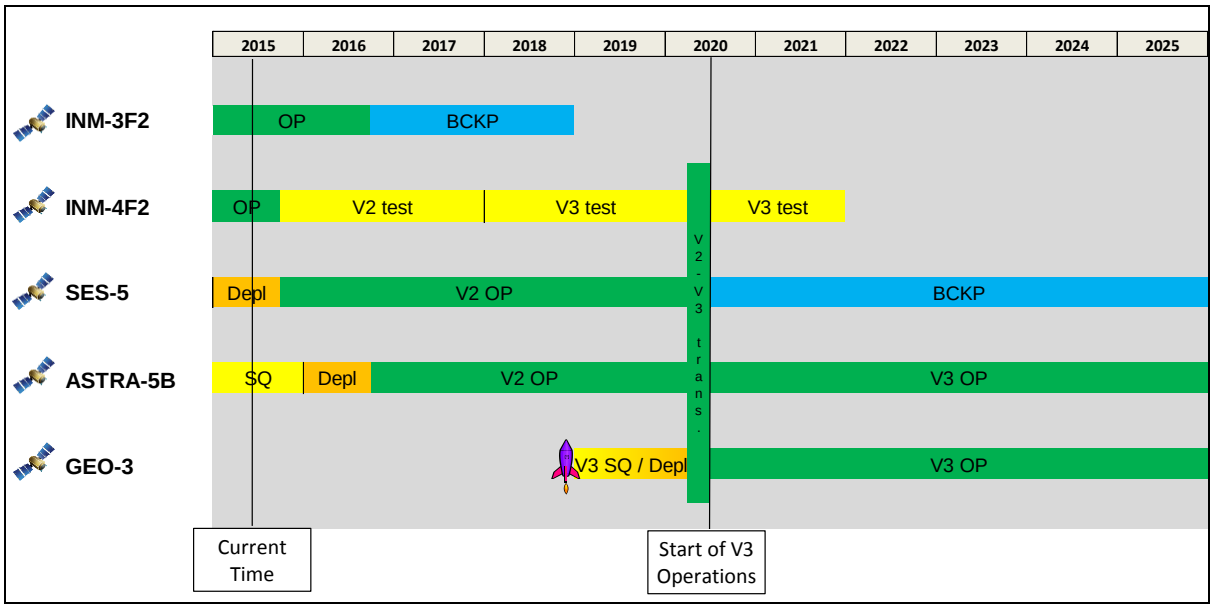

Figure 4: GEO Roadmap

In order to ensure on-time V2-V3 transition in 2020, GSA envisages to start the procurement of the new EGNOS Payload (GEO-3) by end of 2015 considering a typical lead time of 27-30 months until the GEO-3 payload would be ready for operations. In parallel, the GSA and ESA will prepare the necessary evolutions in the ground infrastructure to integrate the future GEO-3 payload in the EGNOS V3 system. Once operational qualification is declared, the GEO-3 service provision phase is expected to last for about 15 years. EGNOS being one major component for the implementation of the EC Single European Sky (SES) initiative in collaboration with Eurocontrol, the continuity of the service has to be ensured with a long term perspective.

The GEO-3 contract for the provision of SBAS payload services will be established with the GSA.

7 EGNOS GEO Payload Service Procurement

7.1 General information

7.1.1 Scope

The main purpose of the Request for Information is to obtain information from the participants and thus enable GSA to decide with ESA advice the way of procuring the service and embarking an EGNOS payload on a GEO satellite.

The participants in preparing their answers are invited to take into account that the GSA is currently considering with ESA the following scope of procurement of the EGNOS GEO payload and service:

1. Provision of the EGNOS GEO-3 payload Service (SBAS signal relay) in line with the requirements expressed in the SBAS specifications [4] [5] [6] .

2. Procurement of launch, in-orbit test and commission of the EGNOS GEO-3 payload, in line with the requirements imposed by the SBAS specifications [4] [5] [6] as well as the additional requirements that will be specified as part of the envisaged procurement.

3. Provision of two independent RF Uplink Services for transmission of the SBAS signals from the NLES stations to the GEO satellite. This also includes the hosting and maintenance services for the NLES equipment.

Optionally, the procurement of a second similar Navigation Payload on the same GEO satellite and its associated RF Uplink stations may be envisaged by the GSA (dual PRN GEO).

7.1.2 Timeline

Although the present RFI does not constitute in any way a commitment for a subsequent procurement procedure, currently the GSA is considering the following procurement roadmap:

- June 2015: GEO-3 RFI publication to market participants
- 31 July 2015: Deadline for reception of RFI answers
- November 2015: Tentative publication of the GEO-3 envisaged procurement (TBC)
- Mid 2016: GEO-3 Contract signature (TBC).

7.1.3 Procurement approach

The following approaches are considered for the GEO-3 procurement, all assuming a complete procurement of the GEO-3 payload by the contractor at its own cost but with different payment plans for the GSA.

Approach 1:

This approach would foresee a payment plan with equal yearly leasing fees for the GSA once the payload is accepted for the service (a pre-financing could also be considered at the start of the service provision phase).

Under this approach the GEO-3 service provider has to provide a full technical file demonstrating the compliance to the envisaged procurement requirements, including technical specifications and readiness for integration into the EGNOS system.

Approach 2:

This approach also assumes a complete procurement of the payload by the participant but with full financing of the capital costs by the GSA. Payments would be made at successful formal reviews during the development phase. The subsequent operations will result in yearly operations fees for the GSA (a pre-financing could also be considered at the start of the service provision phase).

Under this approach, the GEO-3 service provider has to provide during the development phase a progressive demonstration through a process of formal reviews, of compliance to the envisaged procurement requirements, including technical specifications and readiness for integration into the EGNOS system.

7.2 Requested feedback

In their answer to the present RFI, the following should be specified:

1. Future Satellite Plans and Possibility to embark an EGNOS Payload
   A short description of future satellite plans where the EGNOS Payload can be accommodated indicating the planned launch date, compatible with the required deadline of end 2018.

   The technical possibility to embark an EGNOS Payload on a future satellite having regards to:

   - Orbital location constraints to cover the ECAC region (see Figure 2).
   - Mass/Power/Physical Accommodation constraints to embark an EGNOS payload as a piggy back mission on the satellite.
   - Requirements for the provision of SBAS services in L1 and L5 band [4] [5] [6] .
   - Satellite manoeuvres plans including assessment of the propulsion sub-system.

2. Possibility to embark a second Navigation Payload on the same GEO satellite
   Information regarding the technical feasibility and possibility to embark a second Navigation payload complying with the requirements listed in Section 8.

   The main technical risks identified for this dual PRN configuration of the GEO satellite are expected to be presented by the participants.

3. Proposed Schedule for the EGNOS Payload Procurement

Information regarding the timing constraints to embark an EGNOS payload on his future satellites, in particular, the latest deadline, with respect to the proposed procurement schedule, to initiate an EGNOS Payload Procurement for the potential hosting of an EGNOS payload on his GEO satellites.

4. EGNOS Payload Procurement, In Orbit Test, Commissioning

   Information on the way they intend to procure, to conduct in-orbit testing and to commission the EGNOS payload explaining the intended supply process.

   NOTE: GSA and ESA will have the right to participate to the payload development reviews/IOT/commissioning activities (reviews, test campaigns...).

5. EGNOS RF Uplink Stations and Hosting Sites

   Information regarding the possibility to provide two RF Uplink Stations and respective Hosting Sites located in EU-28 territories for the uplink of the SBAS signals to the EGNOS GEO-3 Payload.

6. Feedback to Technical Requirements

   The participants are invited to provide a preliminary feedback on requirements listed in Section 8. Although a proposal with a demonstration of compliance is not requested at this stage, the participants are invited to identify the potential critical elements for the procurement.

   The participants are invited to provide information on satellite manoeuvres expected during satellite life time, general payload operations and troubleshooting that may impact the availability and continuity of the EGNOS Payload Service.

7. Feedback to Security Considerations

   The participants are invited to provide an indication on relevant security measures including the GEO satellite development activities, RF station and Satellite operation infrastructures.

   It has to be noted that European Security regulation will apply to the envisaged procurement.

8. Applicable Standards

   The participants are invited to indicate the typical standards (ECSS or equivalent) which are followed for their satellite programs and the foreseen standards for EGNOS Payload Service (Payload, RF Uplink Stations, Hosting Sites).

9. Procurement Approach

The participants are invited to propose their feedback on the alternative procurement approaches described in 7.1.3.

The participants are therefore invited to provide a first feedback on the rough estimate of EGNOS GEO-3 payload procurement and leasing cost range assuming a leasing contract duration of 15 years and on its usual pricing policy with regards to the proposed procurement approaches.

The participants should note that the cost range information will be used solely for making a decision on whether and according to which terms and condition of the envisaged procurement and would not be used for other purposes.

8 Preliminary Set of EGNOS Payload Service Requirements

This section presents a preliminary set of requirements for the EGNOS GEO-3 Service with the scope of helping the participants to better assess the possibility to procure a piggy-back payload on one of their future GEO satellites.

The EGNOS GEO-3 Service includes the EGNOS Payload, RF-Uplink, and Hosting Site and their operations in compliance with the performance requirements.

Requirements in the present RFI have to be intended as preliminary and the refined complete list of requirements expected in the future envisaged procurement.

Further details on the required SBAS signal characteristics and performance can be found in [4] [5] [6] .

8.1 EGNOS GEO-3 Service Requirements

EGNOS GEO-3 Service Duration

The EGNOS GEO-3 Service shall be provided for a duration of 15 years from the operations start date.

Satellite Orbital Position

The Satellite hosting the EGNOS Payload shall be located in a GEO orbital position providing coverage over the area specified in Figure 2.

Note: A minimum separation angle with other SBAS GEO satellites will be defined for the envisaged procurement.

EGNOS GEO-3 Service Availability

The outage rates and durations of the EGNOS GEO-3 shall not be higher than:

	Mean Time between Outages	**Mean Duration**
Outage Mode 1	1 year	10 minutes
Outage Mode 2	10 years	36 hours
Outage Mode 3 (Fatal Failure)	-	No restoration until new launch

The potential service provider shall elaborate on his ability to propose a solution for the restoration, after fatal failure, through the use of a spare satellite or a launch of a new satellite.

Note: An outage is defined as a period of time during which the service is not provided according to the requirements (e.g. performance is not compliant to the specifications). This includes also unavailabilities caused by manoeuvres, SW upgrades, preventive maintenances, etc.

GEO Ranging Support

The EGNOS Payload shall support the GEO ranging function, as defined in [4] and [6] by relaying the GEO ranging signal produced by the NLES on-ground.

GEO Ranging Support Accuracy

The equivalent degradation of the GEO ranging accuracy due to the EGNOS payload shall not be greater than TBD m.

Note1: At the time of the RFI, suggestion on what might be achievable figures in terms of degradation of the GEO ranging accuracy are welcomed.

Note2: Requirements on the probability of occurrence of certain Feared Events will be specified for the Payload at a later stage.

8.2 EGNOS Payload Requirements

8.2.1 Functional Requirements

Transparent Navigation Payload

The EGNOS Payload shall provide transparent channel broadcasting of the SBAS signals transmitted by the NLES towards the ground receivers.

Note: A trade-off of various transparent payload configurations (e.g. conventional or enhanced synchronisation using on board GNSS receiver) can be considered and proposed. Justifications can be provided on the basis of navigation performance advantages.

EGNOS Payload Antennas

The following dedicated antennas shall be accommodated for the EGNOS Payload:

- L-Band Downlink Antenna
- Uplink Antenna

Number of Channels

The EGNOS Payload shall provide two channels to support independent transmission of L1-band and E5-band SBAS signals.

Frequency Translation

The EGNOS Payload shall provide frequency translation for the two received uplink channels to the downlink channels.

8.2.1.1 Performance Requirements

Antennas Requirements

Downlink Antenna Transmit Coverage

The satellite shall provide a global coverage that includes the area specified in Figure 2.

Note: The global coverage is defined as all points in the FOV of the downlink antenna that receive the L-band downlink signals with a minimum elevation of 5 degrees.

Downlink Antenna Gain Variation

The variation of the downlink antenna gain from any location within the global coverage shall not exceed 1.0 dB.

Downlink Antenna Polarisation

The broadcast signal shall be right-handed circularly polarized (RHCP).

Downlink Antenna Axial Ratio

The axial ratio shall be better than 2 dB within the coverage area and for the full operational bandwidth.

Uplink Antenna Receive Coverage

The receive coverage of the EGNOS Payload shall ensure that the uplink signal can be transmitted from two different stations in Europe (EU-28).

Radio Frequency Requirements

L-Band Downlink Signals

The EGNOS Payload shall provide L-band signals at the GPS L1 and Galileo E5 (comprising GPS L5) frequencies, as shown in the following table.

	Channel 1	**Channel 2**
Frequency Band Name	L1	E5
Centre Frequency	1575.42	1191.795
Number of Carriers	1	1 or 2 (TBC)
3 dB Bandwidth (MHz)	24	54.69
Min/Max Rx Power On Ground (dBW)	-158.5 @ 5° El -149.5 @ 90° El	-158 @ 5° El -150 @ 90° El

Note1: The min/max received power level on ground for each signal within the respective transmit bandwidth are based on an ideally matched RHCP 0 dBi receiver antenna.

Note2: For each signal it is supposed that 95% of the emitted power is transmitted within the double-sided 3 dB bandwidth.

Note3: Above signal characteristics are provided for a single component (I or Q). The total power per channel is computed by adding a margin of 3dB onto the minimum/maximum received power on ground.

Effective Isotropic Radiated Power

The EIRP for the L1 and E5 channels SIS shall be such that it meets the requirements expressed in [4] [5] [6] and summarised in the *L-Band Downlink Signals* above.

Effective Isotropic Radiated Power Stability

The change in EIRP, at any location in the defined coverage area shall not exceed 1.2 dB peak-to-peak for 24 hours and 1.9 dB peak-to-peak over the service life. This includes antenna contribution as defined in the *Downlink Antenna Gain Variation* above.

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Frequency Translation Accuracy

The frequency translation between C-band and L-band channel frequencies shall have an accuracy better than 1 part in 10^6.

Frequency Linearity between Channels

The relationship between the two channels frequencies shall be linear.

Frequency Spectrum Inversion

The output frequency spectrum of any Payload signal shall not be inverted with respects to the input spectrum.

Carrier Frequency Stability

The frequency stability of the local oscillator shall be better than 10^{-11} over 1 to 100 seconds and better than 2×10^{-7} over the service life.

Phase Noise Spectral Density

The single sideband phase noise spectral density induced on a carrier by the payload shall not exceed the values shown in the following table.

Frequency Offset from Carrier (Hz)	Phase Noise relative to the Carrier (dBc/Hz)
1	-19.5
5	-47.5
10	-52.5
1E2	-66.5
1E3	-74.5
1E4	-85.5
1E5	-90.5
3E5	-90.5
> 1E6	-92.5

AM/PM Conversion

The AM/PM conversion coefficient for any Payload channel with single carrier RF drive levels up to power amplifier saturation shall not exceed 3.5°/dB for any modulating frequency up to 50 MHz.

In-band Spurious Transmissions

In-band spurious transmissions shall be at least 40 dB below the un-modulated carrier power over the channel bandwidth (L1 and E5).

Out-of-band Spurious Transmissions

Out-of-band spurious transmissions shall be compliant to ITU regulations.

8.2.1.2 Navigation Signals Quality Requirements

Phase Linearity

The EGNOS Payload shall ensure phase linearity for each channel with a maximum peak-to-peak phase variation of ±2° across any 1 MHz over the entire channel bandwidth.

Gain Variation

The peak-to-peak gain variation over frequency for the L1 and E5 channels shall be less than 0.6 dB.

Group Delay Stability

The variation of the code phase delay on any single signal component shall be less than 10 ns (1 sigma) over any 24 hour period and within the coverage of the navigation antenna.

Correlation Loss

The correlation loss resulting from modulation imperfections and filtering inside the SBAS satellite payload will be less than 1 dB. This applies for the I and Q channels if available.

Note: Correlation loss is defined as the ratio of output powers from a perfect correlator for two cases: 1) the actual received SBAS signal correlated against a perfect unfiltered PN reference, or 2) a perfect unfiltered PN signal normalized to the same total power as the SBAS signal in case 1, correlated against a perfect unfiltered PN reference.

8.2.2 Operational Requirements

EGNOS Payload Channels Control

The two EGNOS Payload Channels shall have independent adjustments and command functions for power amplifier switch ON/OFF, channel gain and level control setting.

Cessation of Emission

It shall be possible to turn each individual EGNOS Payload Channel on or off by ground command. This operation shall be independent of gain settings.

Doppler Shift

The maximum instantaneous Doppler shift in the L-band downlink signals at any fixed location within the global coverage shall not exceed ±210 Hz at L1 and ±157 Hz at L5. This includes all possible effects introduced by the RF Uplink, Navigation Payload, and satellite manoeuvres.

8.3 EGNOS RF Uplink Station and Hosting Site Requirements

NLES Antenna Steerability and Tracking Accuracy

The antenna shall be capable of being pointed to any location on the geostationary arc visible to the NLES and be capable of tracking the satellite movements with accuracy such that the EIRP stability is according to EIRP specifications above**Error! Reference source not found.**.

Site RF environment

The EGNOS sites selected for NLES shall provide an RF environment free of interference by providing:

- An appropriate antenna site selection
- Suitable filtering of emission by offending sources
- Regulatory mandates to curtail offending interference sources.

GNSS antenna clear horizon

The site shall allow a GNSS antenna location with clear horizon above 12°.

Multipath protection

The hosting site shall offer a low multipath environment for the GNSS omnidirectional antenna.

Space requirement

The Hosting Site shall have the appropriate room for hosting the NLES and network equipment, for operations, storage, and staffing.

Minimal Security Protections

NLES sites shall offer as a strict minimum the following minimal security protections:

- Perimeter fence
- Intruder detection system
- Integrated Central Control TV
- Possible power fence in support of perimeter fence
- Man guard reaction force
- Control access point(s)

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